Expert Group: Identification of Connection Requirements for Offshore Grids

- A status report of ongoing EG CROS progress in Phase II

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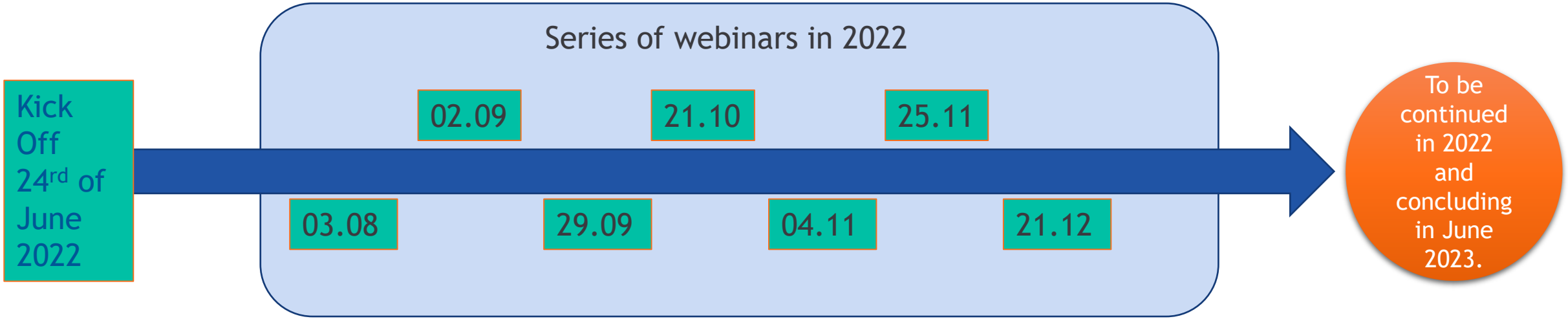
EG CROS chaired by ENTSO-E, under the Grid Connection European Stakeholders Committee

Presented by: Mario Ndreko (TenneT TSO GmbH), Adrian Gonzalez (ENTSO-E Secretariat)

Timeline of the EG CROS Phase II



Some of the ongoing actions in the EG:

- Development of new NC HVDC definitions
- Draft new requirements for power-to-gas and electricity storage units connected at offshore HVDC interface points
- Legal text proposal for grid forming capability for HVDC systems (Art. 14)

New definitions for NC HVDC (2/2)

Proposal for change of definition

Existing definition
'DC-connected power park module' means a power park module that is connected via one or more HVDC interface points to one or more HVDC systems;

New proposal
'Interface point connected power park module' means a power park module that is connected via one or more HVDC interface points to one or more HVDC systems;

Same change are suggested for DC connected power to gas demand facility and DC connected electricity storage module, i.e. **"Interface point connected power to gas demand facility" and "Interface point connected electricity storage module".**

Applicability of NC HVDC to offshore power to gas and storage connected to HVDC interface points (1/3)

Motivation

- The connection of loads and storage units at offshore systems is not yet regulated.
- There is a clear trend from TYNDP to integrate offshore into hubs with loads and generation

Consequence

- NC HVDC should be expanded in order to include a new chapter that deals with **Interface point connected** power-to-gas demand facility and storage modules.

EG CROS will make proposals for amendments of the NC HVDC according to the ToR of phase II

New definitions for NC HVDC (1/2)

Main definitions on discussion:

- **'electricity storage'** means the conversion of electrical energy into a form of energy which can be stored, the storing of that energy, and the subsequent reconversion of that energy back into electrical energy; (from storage EG)

- **'electricity storage module' or 'ESM'** means a power generating module which can inject and consume active power to and from the network for electricity storage, excluding pump-storage power-generating modules; (from storage EG)

- **'Interface point connected power-to-gas demand facility'** means a demand facility which consumes electrical energy to produce hydrogen or other gasses and is connected via one or more HVDC interface points to one or more HVDC systems; (new)

- **'Interface point connected electricity storage'** module is an electricity storage module that connected via one or more HVDC interface points to one or more HVDC systems; (new)

Applicability of NC HVDC to offshore power to gas and storage (2/3)

The title III of NC HVDC should be amended as
”Requirements for **interface point connected** power park modules,
interface point connected power-to-gas demand facility,
interface point connected electricity storage module
and remote-end HVDC converter stations”.

Moreover, the chapter 1 (Requirements for DC-connected power park modules) shall apply also for
interface point connected power-to-gas demand facility and
interface point connected electricity storage module.

More specifically:

Article 38 of NC HVDC (Scope)
- In addition, the following provision may be added: The requirements applicable to transmission connected demand facilities, under Articles 14, 16, 17, 19, 41 and 43 of Regulation (EU) 2016/1388 shall apply to DC-connected power park modules.

Article 39 of NC HVDC (Frequency stability requirements)
- For **interface point connected** power-to-gas demand facility, article 39.1.b, 39.8, 39.9 are excepted (discussion in progress)

Article 40 of NC HVDC (Reactive power and voltage requirements),
- For **interface point connected** power-to-gas demand facility, article 40.2.b.i, excepted (discussion in progress)

Article 41 of NC HVDC (Control requirements, synchronisation)

Applicability of NC HVDC to offshore power to gas and storage (3/3)

Article 42 of NC HVDC (network characteristics, SCR and fault and pre-fault conditions)

Article 43 of NC HVDC (protection requirements, protection priority ranking)

- For interface point connected power-to-gas demand facility, article 43.2 reference must be changed to article 16 (EU) 2016/1388

Article 44 of NC HVDC (power quality and interaction studies, models and share of data and models)

- Same requirements as for PPM shall apply

Article 45 of NC HVDC (General system management requirements applicable to DC-connected power park modules)

- For interface point connected power-to-gas demand facility, article 16.4 only applies if island operation is applicable.
- General: Events caused by Energization of demand units or facility infrastructure must be included.

Next step

- For offshore PtX and storage requirements detailed requirement will be elaborated in article 38 to 45. (including and adjusting all sub-clauses)

Grid forming capability defined in NC HVDC

- Discussions have already started on the legal text proposal for NC HVDC
  - Art. 14 to be replaced by grid forming capability
  - Grid forming capability for DC connected PPM and electricity storage modules considered important for stable operation
- **First proposal is made on basis of what ENTSO-E proposed for NC RfG. Discussions in progress**
- Particular use case defined that leads to new capabilities for remote and HVDC converter station.
- TD Europe will nominate experts from three EU HVDC suppliers
- Hydrogen Europe has nominated one expert

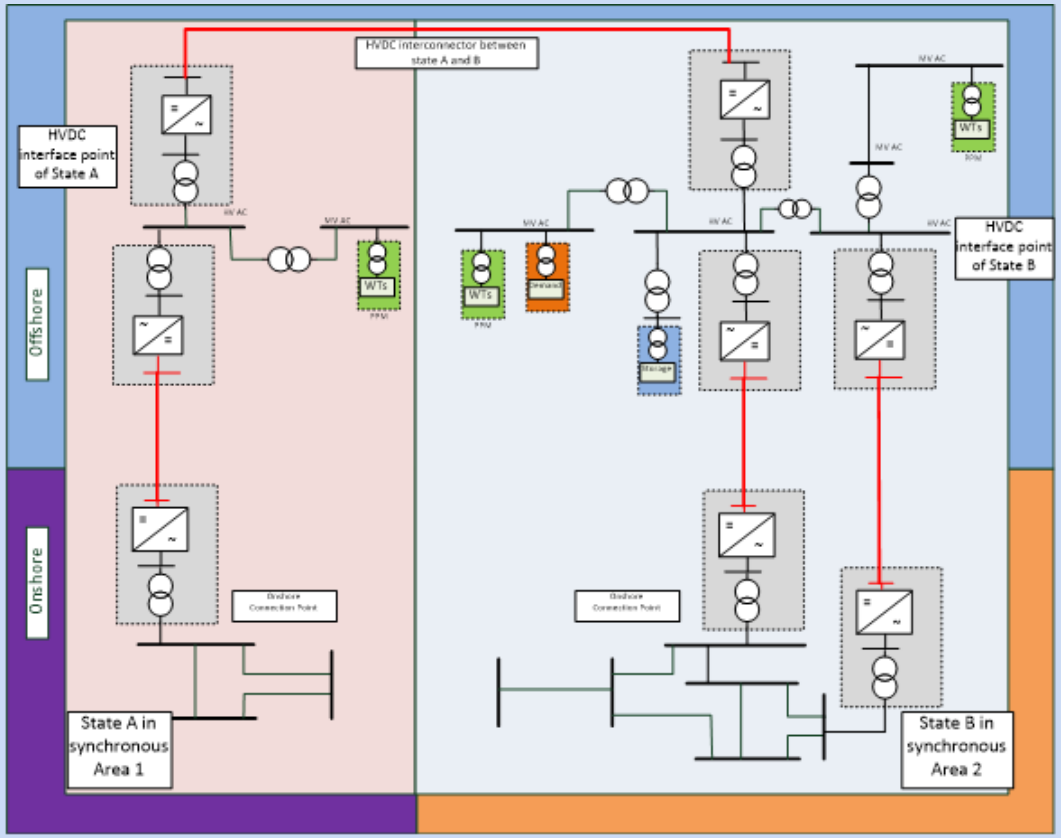


Figure 4. Topology showing DC connected HVDC interface point that belond to different synchronous areas.

Work plan for 2023 and towards NC HVDC amendments

Main points for consideration with regard to the amendment process of NC HVDC

- DC connection point requirements at DC-PoC for HVDC systems **should be part of a future new** DC Grid Code that the EC needs to initiate
- The new DC Grid Connection Code shall integrate results of on going research projects (interOPERA) and wait for operation experience of **multi-vendor** HVDC projects (2026-2027).
- EG CROS will only provide some high level recommendations of what DC Grid code may include.